Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EE311

Course Name: ELECTRICAL DRIVES & CONTROL FOR AUTOMATION (AU, ME)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks Marks

1 a) Give the classification of the DC generators depending upon their field excitation with simple sketches. (5)

b) An 8-pole wave connected DC generator has 1000 armature conductors and flux per pole is 0.035Wb. At what speed must it be driven to generate 500V? (2)

c) Draw the open circuit characteristics of a DC shunt generator and define critical resistance. (3)

2 a) A DC shunt generator having a terminal voltage of 250V delivers a load current of 195A. The armature and shunt field resistances are 0.05 ohm and 50 ohms respectively. Calculate: (2)
i) Armature current ii) Generated emf in armature.

b) With the help of a neat circuit diagram explain the procedure for obtaining the internal and external characteristics of a DC shunt generator. (6)

c) Write any two methods for compensating the effects of armature reaction in DC generators. (2)

3 a) Explain how the torque is developed in a DC motor? (3)

b) What is meant by back emf in DC motors? A 230 V DC shunt motor takes 32 Amp at full load. Find the back emf on full load if resistances of motor armature and shunt field windings are 0.2 ohm and 115 ohms respectively. (3)

c) Give the classification of DC motors with applications. (4)

4 a) Draw the power conversion stages of a DC motor. (2)

b) With a neat figure explain the method for conducting load test in a DC shunt motor. (6)

c) Why starter is necessary in a DC motor? (2)

PART B

Answer any three full questions, each carries 10 marks

5 a) A 40 KVA single phase transformer has 400 turns on the primary and 100 turns on the secondary. The primary is connected to 2000 V, 50 hz supply. Determine: (3)
i) The Secondary voltage on open circuit
ii) Maximum value of flux.

b) Draw the phasor diagram of a single-phase transformer with inductive load and mark each phasor clearly. (2)

c) What is an auto transformer? With suitable derivations, prove that there is saving of copper in auto transformer compared to ordinary transformer. (5)

6 a) Obtain the approximate equivalent circuit With respect to low voltage side of a given 200/2000 V single phase 30 KVA transformer having the following test results. (6)
O.C test:- 200V, 6.2A, 360W on L.V. side
S.C test:- 75 V, 18A, 600W on H.V side

b) Define the all-day efficiency of a distribution transformer. What is its significance? (2)

	c)	What are instrument transformers? Give its types.	(2)
7	a)	With neat sketch, explain the development of rotating magnetic field in a three-phase induction motor.	(5)
	b)	Define slip and draw the torque slip characteristics of a three-phase induction motor.	(2)
	c)	A three phase induction motor has 2 poles and is connected to 400 V, 50 hz supply. Calculate the actual rotor speed and rotor frequency when slip is 4%.	(3)
8	a)	Draw the equivalent circuit per phase of a three-phase induction motor and explain.	(5)
	b)	A 40 KW 6 pole three phase induction motor delivers full load output at 950 rpm at 0.85p.f when connected to a 500 volt, 50 hz supply. Friction and windage losses equals 1.5KW and stator losses are 1.8KW. Determine for this load: i) Total copper loss ii) Efficiency.	(5)

PART C

Answer any four full questions, each carries 10 marks

9	a)	Describe principle of working of single phase induction motors with neat sketches.	(5)
	b)	With suitable graphs explain the method to determine voltage regulationof an alternator by EMF method.	(5)
10	a)	Derive the emf equation of an alternator.	(3)
	b)	Write a note on the starting of synchronous motors.	(3)
	c)	Draw and explain the 'V' curves of a synchronous motor.	(4)
11	a)	A three-phase star connected alternator is rated at 1600 KVA, 13500 Volt. The armature resistance and synchronous reactance are 1.5 and 30 ohms respectively per phase. Calculate the percentage voltage regulation for a load of 1820 KW at 0.8 leading p.f.	(4)
	b)	What are universal motors? Explain their working.	(3)
	c)	Define distribution factor and pitch factor of an alternator.	(3)
12	a)	Draw the schematic diagram of a variable reluctance motor and explain its working.	(7)
	b)	What is micro stepping? Determine the step angle of a variable reluctance stepper motor with 12 teeth in stator and 8 rotor teeth.	(3)
13	a)	Draw the stepper motor characteristics and explain. Also list the applications of stepper motors.	(5)
	b)	With suitable block diagrams explain the control of stepper motors.	(5)
14	a)	Give the two major classification of general control systems and explain them with suitable block diagrams. Give examples for each type.	(6)
	b)	Write a note on different types of controllers for automation.	(4)

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